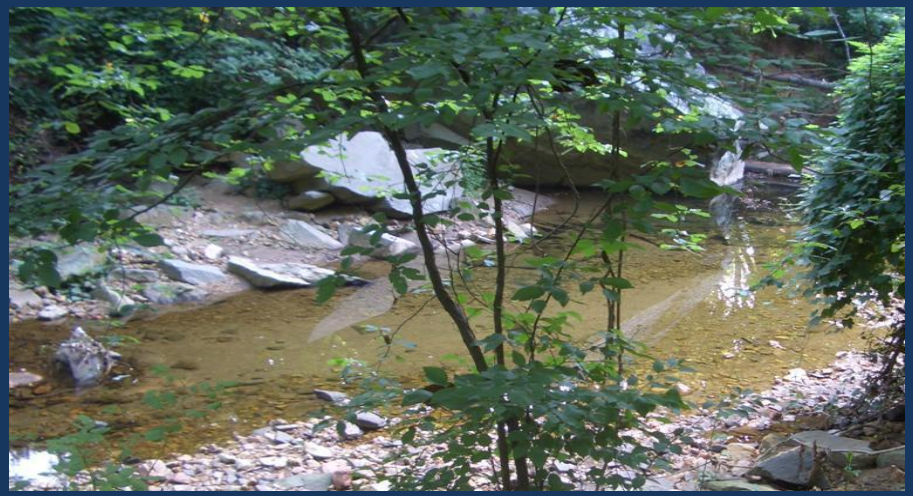
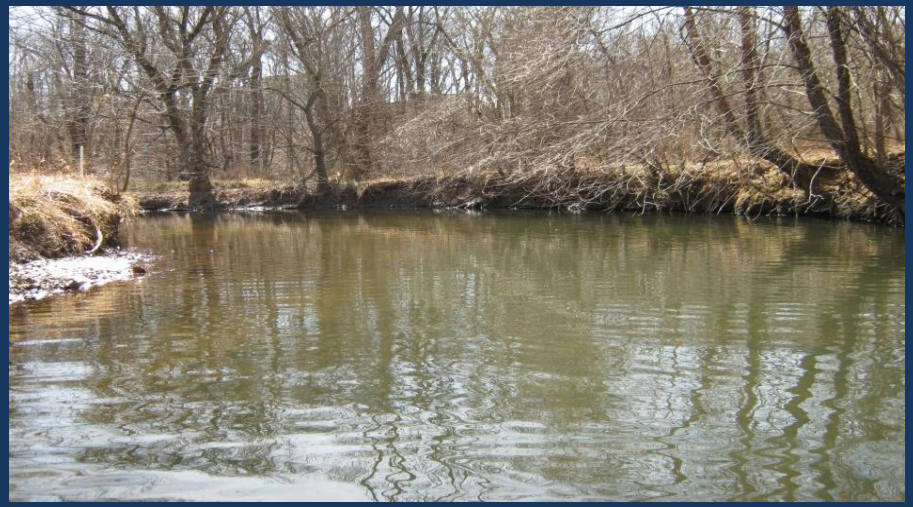
Bacteria Total Maximum Daily Load Studies for Tributaries to the Potomac River

Sugarland Run, Mine Run, and Pimmit Run





Final Public Meeting - December 14, 2011

Why are we here?

Portions of several tributaries to the Potomac River do not meet water quality standards.

- **Who is involved in this process?**
- **Which tributaries are included in this study?**
- **How do we know the standards aren't being met?**
- **Why aren't the standards being met?**
- **What is being done to correct the problem?**

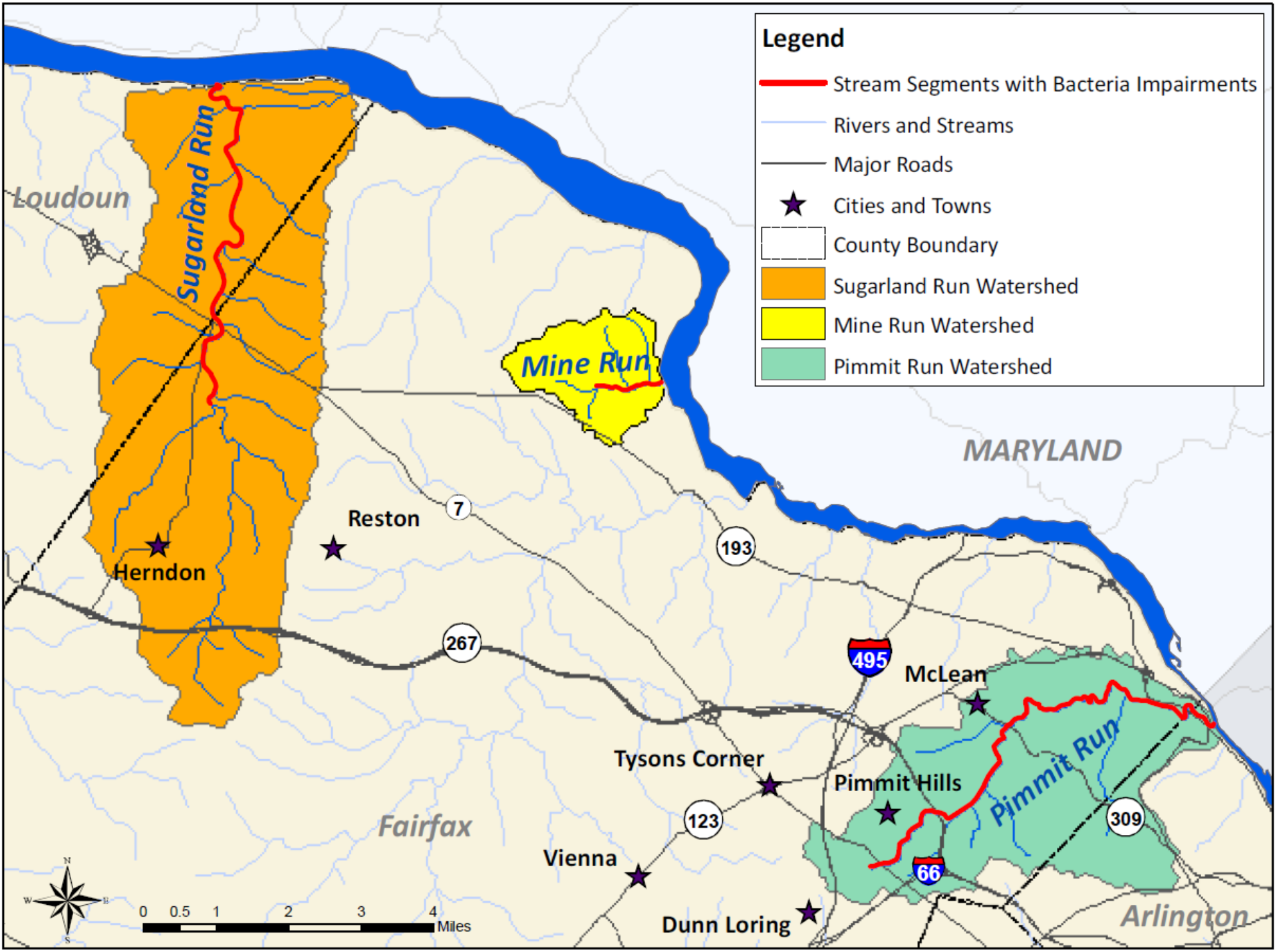
Who is involved in this process?

DEQ :	**Lead Agency for TMDL Development**
DCR :	**Partners with DEQ in TMDL Development, Lead Agency for TMDL Implementation Plan Development**
Contractor:	**Performs Modeling for TMDL Development (for this project, contractor is the Louis Berger Group).**
TAC:	**Representatives from state and local governments, watershed groups, planning district commission, soil and water conservation districts, etc. Provides technical input and information for TMDL development.**
Citizens:	**Any citizen who wishes to participate in the project; provide local knowledge and information.**

What streams are involved in this study?

Waterbody Name *Location*	**Segment Size**	**Cause**	**Upstream Limit**	**Downstream Limit**	**DEQ Monitoring Station(s)** *Station Location*	**Year First Listed as Impaired**	**2010 Exceedance Rate**
Sugarland Run *Fairfax County Loudoun County Town of Herndon*	0.95 miles	*E. coli*	Confluence with Folly Lick Branch	Boundary of the PWS designation area, at rivermile 4.82	**1aSUG004.42** *Route 7 Bridge Crossing*	2006	5 of 28 samples (17.9%)
	4.77 miles	*E. coli*	Boundary of the PWS designation area, at rivermile 4.82	Confluence with the Potomac River	**1aSUG004.42** *Route 7 Bridge Crossing*	2002	5 of 28 samples (17.9%)
Mine Run *Fairfax County*	0.93 miles	*E. coli*	Confluence with an unnamed tributary to Mine Run	Confluence with the Potomac River	**1aMNR000.72** Route 603 Bridge Crossing	2006	3 of 12 samples (25.0%)
Pimmit Run *Arlington County Fairfax County*	1.62 miles	*E. coli*	Confluence with Little Pimmit Run	Confluence with the Potomac River	**1aPIM000.15** *Route 120 (Glebe Road) Bridge Crossing*	2010*	3 of 11 samples (27.3%)
	2.46 miles	*E. coli*	Route 309 bridge crossing	Confluence with Little Pimmit Run	**1aPIM001.89** *Ranleigh Road Bridge Crossing*	2010*	3 of 14 samples (21.4%)
	3.29 miles	*E. coli*	Headwaters of Pimmit Run	Route 309 bridge crossing	**1aPIM004.16** *Route 309 Bridge Crossing*	2010*	4 of 10 samples (40.0%)

** Pimmit Run was originally listed with a fecal coliform bacteria impairment from 2002 to 2008. 2010 was the first assessment cycle where Pimmit Run was listed as impaired for E. coli.*


Legend
Stream Segments with Bacteria Impairments
Rivers and Streams
Major Roads
Cities and Towns
County Boundary
Sugarland Run Watershed
Mine Run Watershed
Pimmit Run Watershed
Sugarland Run
Mine Run
Pimmit Run
Loudoun
MARYLAND
Fairfax
Arlington
Herndon
Reston
Tysons Corner
McLean
Pimmit Hills
Vienna
Dunn Loring
7
193
267
495
123
309
66
0 0.5 1 2 3 4
Miles

How do we know if water bodies in Virginia are healthy?

- Perform physical and chemical monitoring on water bodies throughout the state.
- Monitor parameters such as:
  - pH
  - Temperature
  - Dissolved Oxygen
  - Biological Community
  - Bacteria
  - Nutrients
  - Fish Tissues
  - Metals/Toxic Pollutants

What does DEQ do with the monitoring data that is collected?

Compare the data collected to the water quality standards.

Water Quality Standards:

- Regulations based on federal and state law.
- Set numeric and narrative limits on pollutants.
- Consist of designated use(s) and water quality criteria to protect the designated uses.

Designated Uses

- Recreational
- Public Water Supply
- Wildlife
- Fish Consumption
- Shellfish
- Aquatic Life

The attainment of the recreational use is evaluated by testing for the presence of E. coli bacteria in freshwater systems.

Recreational Use Impairment:
Fecal Coliform and *E. coli*

Fecal Coliform:

- Found in the digestive tract of humans and warm blooded animals
- Indicator of the potential presence of pathogens in water bodies

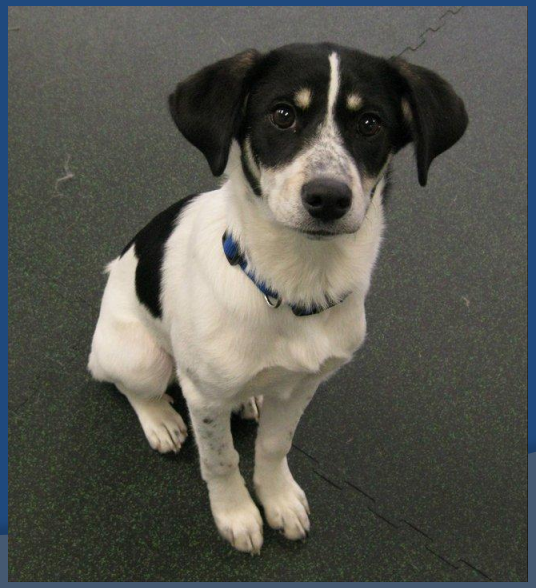
Escherichia coli:

- Subset of fecal coliform bacteria
- Correlate better with swimming associated illness in freshwater

Indicator	Geometric Mean Criterion (cfu/100mL)	Maximum Assessment Criterion (cfu/100mL)
E. coli	126	235

- *Geometric Means are calculated using all data collected during any calendar month with a minimum of four weekly samples.*
- *If there are insufficient data to calculate a monthly geometric mean, no more than 10% of the total samples in the assessment period should exceed 235 cfu/100 ml of E. coli in freshwater.*

Potential Sources of *E. coli* Bacteria



What happens when a water body doesn't meet water quality standards?

- Waterbody is listed as "impaired" and placed on the 303(d) list.
- Once a water body is listed as impaired, a Total Maximum Daily Load value must be developed for that impaired stream segment to address the designated use impairment.
- TMDL Studies are required by law:
  - 1972 Clean Water Act (CWA)
  - 1997 Water Quality Monitoring Information and Restoration Act (WQMIRA)

What is a TMDL ?
Total Maximum Daily Load

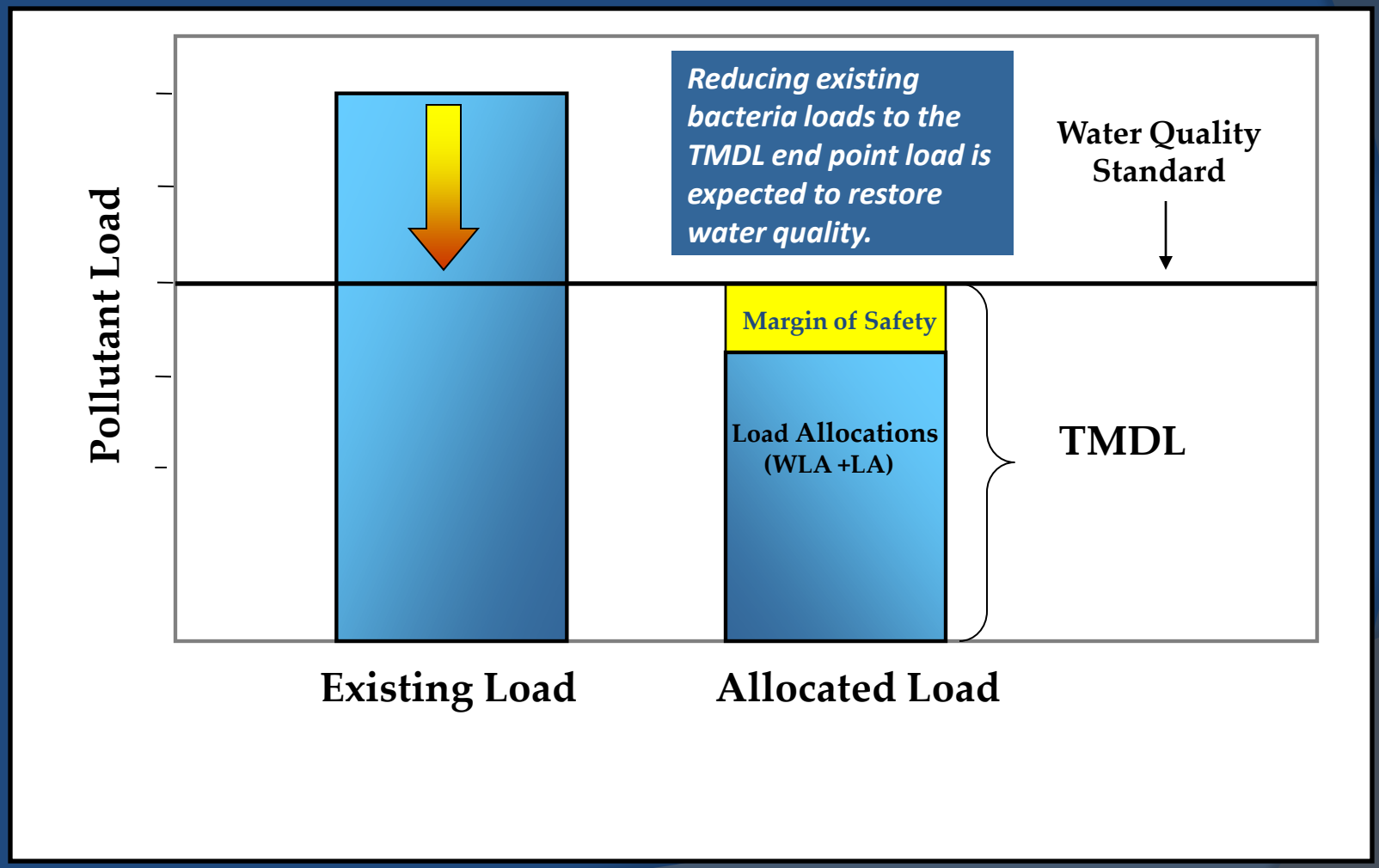
TMDL = Sum of WLA + Sum of LA + MOS

Where:

TMDL = Total Maximum Daily Load
WLA = Waste Load Allocation (point sources)
LA = Load Allocation (nonpoint sources)
MOS = Margin of Safety

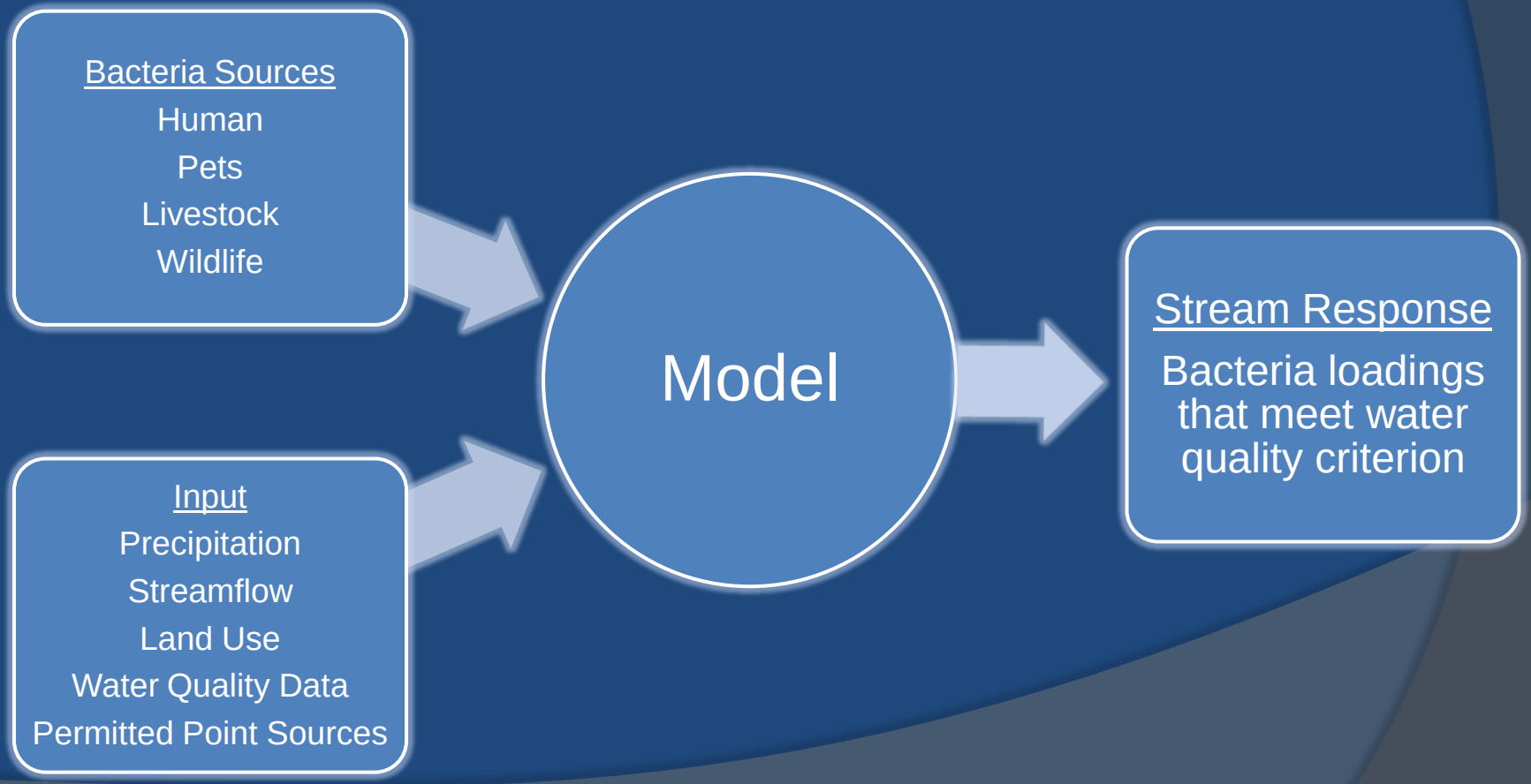
A TMDL is the maximum amount of a pollutant a water body can receive and still meet water quality standards.

An Example TMDL

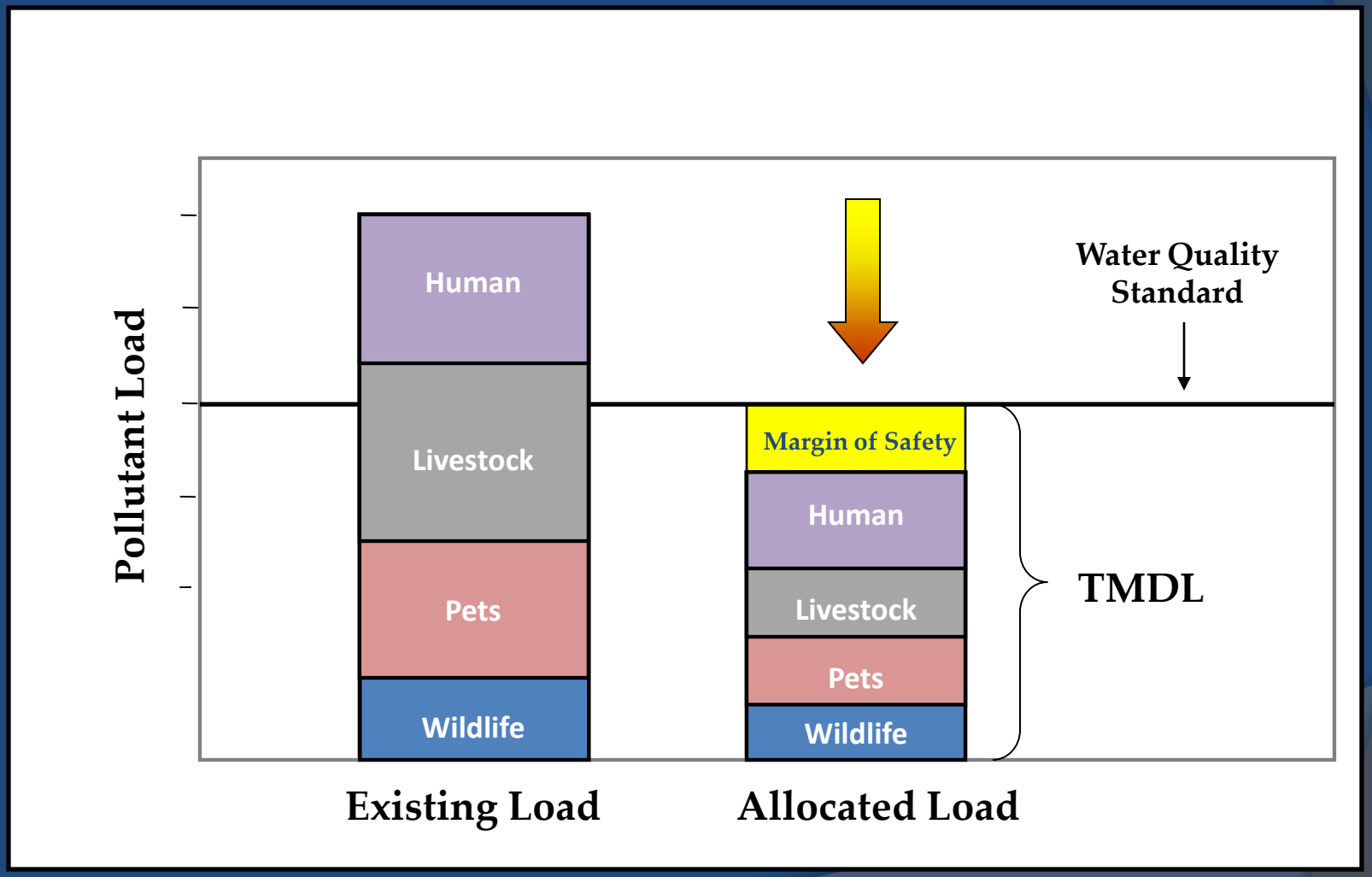


TMDL Development Methodology

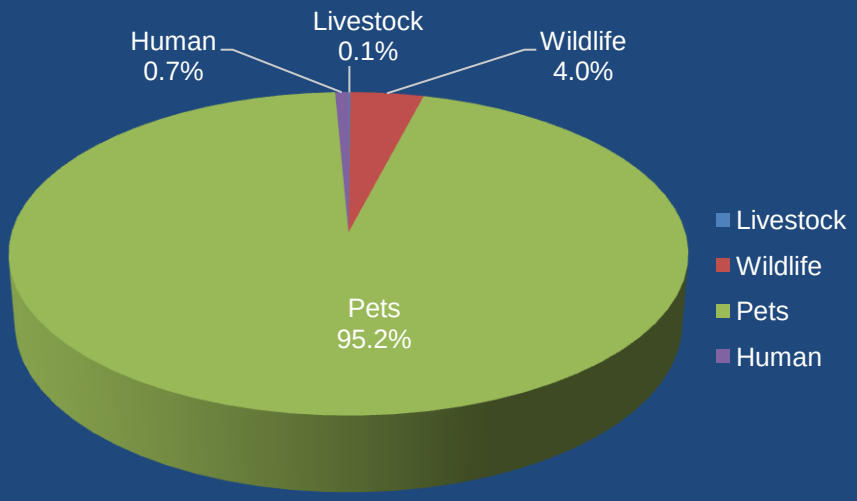
Enter available data into a computer model. Model simulates pollutant loadings into the watershed.



An Example TMDL

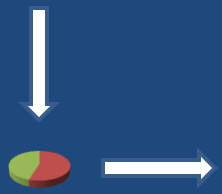


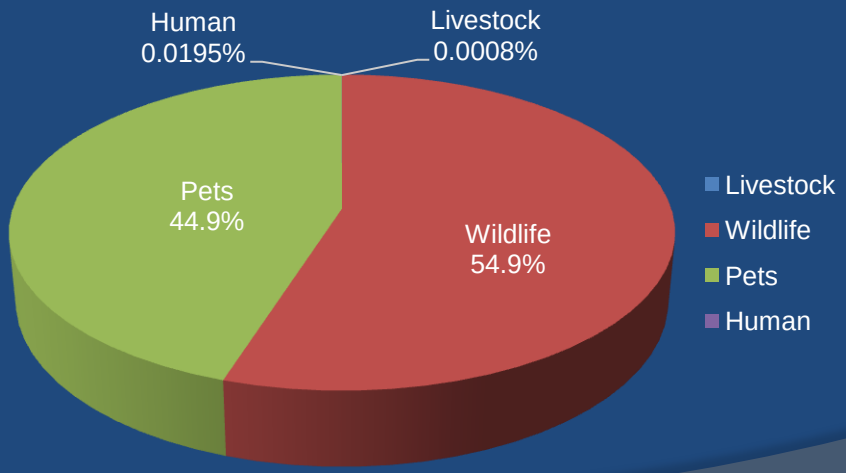
Results for Sugarland Run



Existing Bacteria Loads

93% Reduction



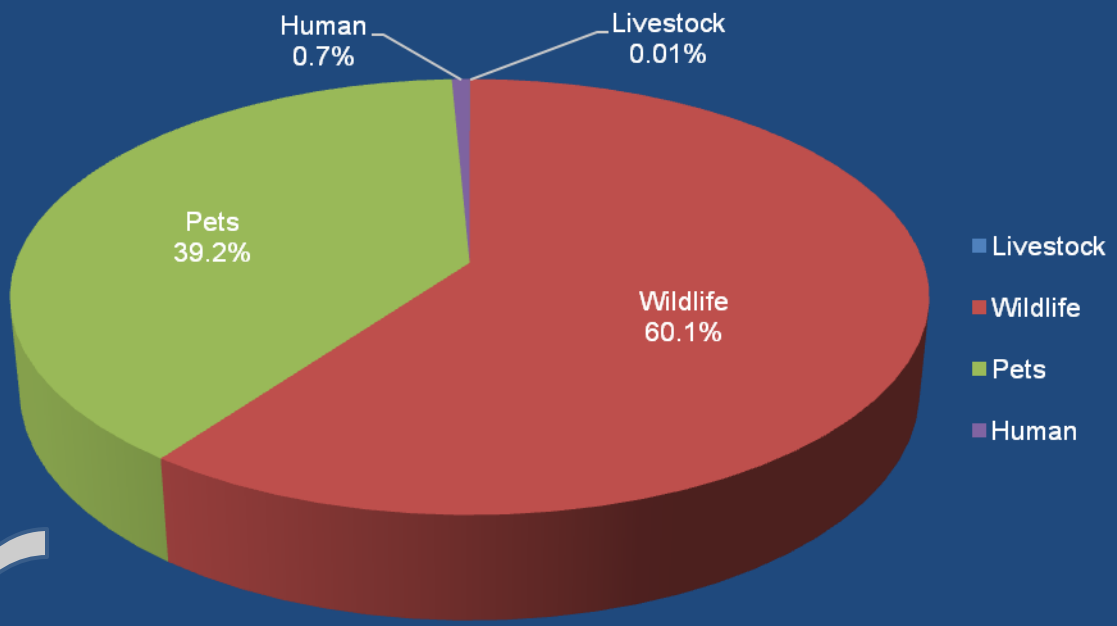


Bacteria Loads Under the TMDL Scenario

Required Reductions for Sugarland Run	
Source	**Percent Reduction**
Human (Failing Sewage Disposal Systems)*	**100%**
Livestock (Direct Deposition)	**100%**
Livestock (Non-Direct Deposition)	**96.6%**
Pets*	**96.6%**
Wildlife (Non-Direct Deposition)	**2%**
Wildlife (Direct Deposition)	**0%**
VPDES Point Sources	**0%**
Overall Required Reductions:	**93%**

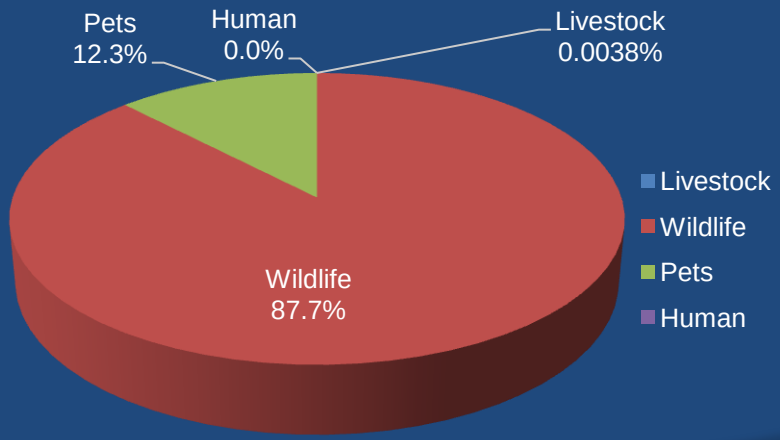
MS4 Required Reduction is taken from developed lands which includes loadings from human and pet sources. Total percent reduction for MS4s is 96.6%.

Results for Mine Run



Existing Bacteria Loads

31.5% Reduction

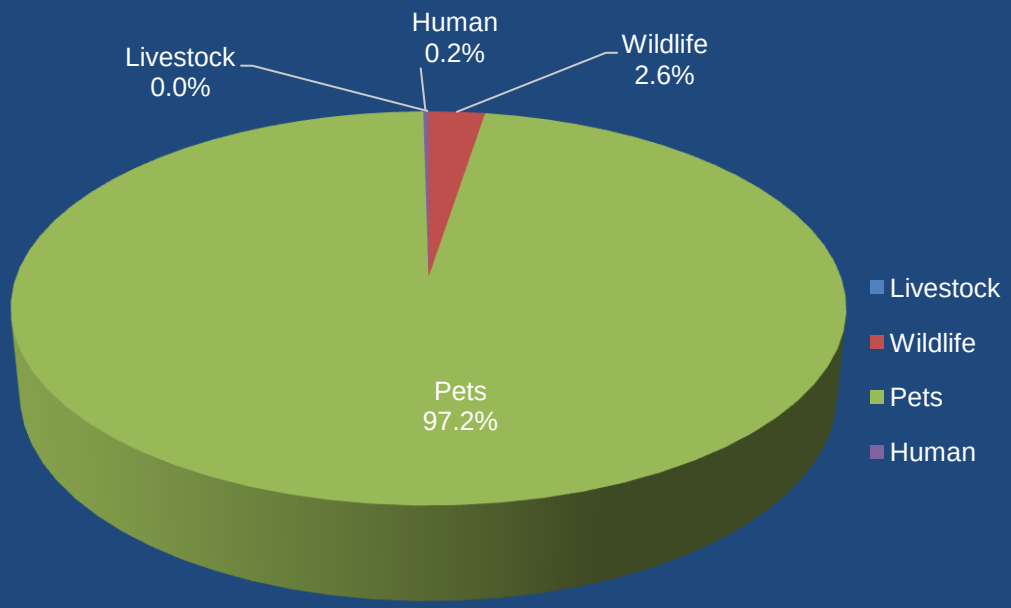


Bacteria Loads Under the TMDL Scenario

Required Reductions for Sugarland Run	
Source	**Percent Reduction**
Human (Failing Sewage Disposal Systems)*	**100%**
Livestock (Direct Deposition)	**100%**
Livestock (Non-Direct Deposition)	**78.5%**
Pets*	**78.5%**
Wildlife (Non-Direct Deposition)	**1.6%**
Wildlife (Direct Deposition)	**0%**
VPDES Point Sources	**0%**
Overall Required Reductions:	**31.5%**

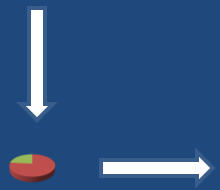
MS4 Required Reduction is taken from developed lands which includes loadings from human and pet sources. Total percent reduction for MS4s is 78.5%.

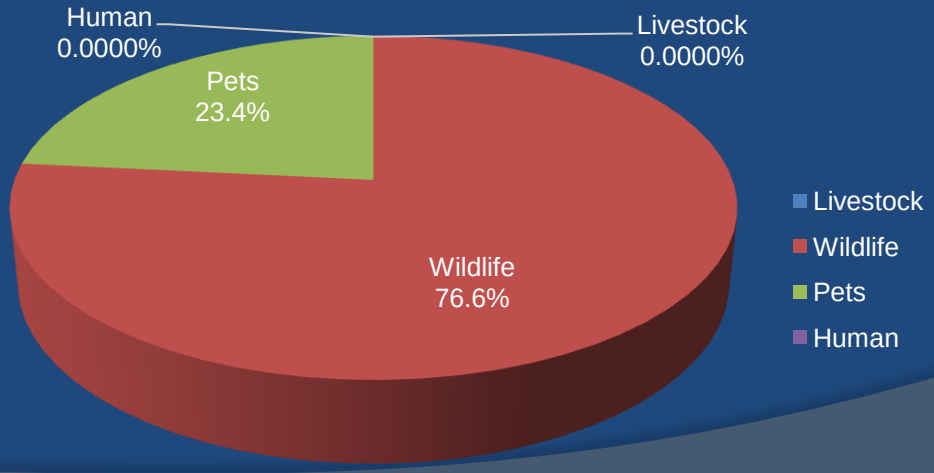
Results for Pimmit Run



Existing Bacteria Loads

97% Reduction





Bacteria Loads Under the TMDL Scenario

Required Reductions for Sugarland Run	
Source	**Percent Reduction**
Human (Failing Sewage Disposal Systems)*	**100%**
Livestock (Direct Deposition)	**100%**
Livestock (Non-Direct Deposition)	**99.2%**
Pets*	**99.2%**
Wildlife (Non-Direct Deposition)	**1.2%**
Wildlife (Direct Deposition)	**0%**
VPDES Point Sources	**0%**
Overall Required Reductions:	**97%**

MS4 Required Reduction is taken from developed lands which includes loadings from human and pet sources. Total percent reduction for MS4s is 99.2%.

TMDL Equations

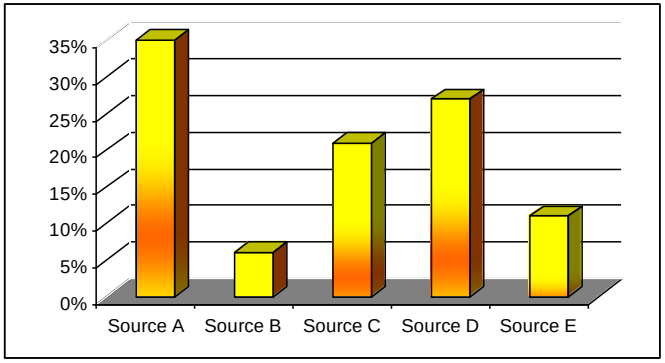
TMDL Equation for Sugarland Run (cfu/year)			
Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)	TMDL
4.11E+12	4.82E+12	Implicit	8.93E+12

TMDL Equation for Mine Run (cfu/year)			
Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)	TMDL
2.78E+11	1.81E+12	Implicit	2.09E+12

TMDL Equation for Pimmit Run (cfu/year)			
Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)	TMDL
1.85E+12	5.72E+12	Implicit	7.56E+12

We are here

TMDL Study

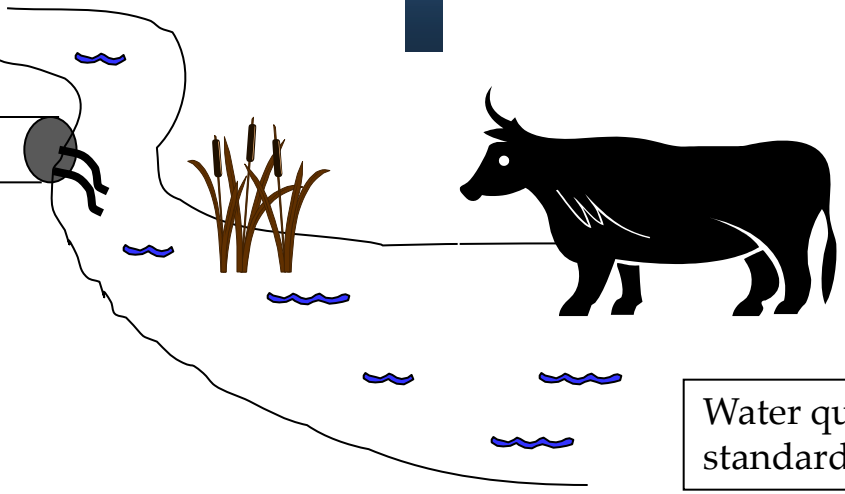


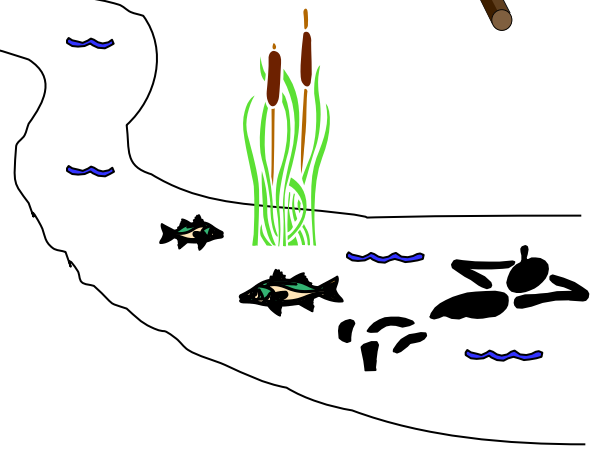
Implementation Plan

DCR

Implementation

Monitoring





Water quality standards not met

TMDL Implementation Plan (IP)

- DEQ - identified the problem and potential sources of pollutants for stream segments of Sugarland, Mine & Pimmit Runs
- Virginia's Water Quality Monitoring, Information, and Restoration Act directs that an IP be developed and implemented
- State agencies, local jurisdictions & community stakeholders have the opportunity to work together to restore water quality in the local watershed

We Have a Proven Plan

- Many IPs have been developed before
- Focus on breaking up the problem into:
  - Residential Working Group
  - Agricultural Working Group
  - Government Working Group
- Each WG will report their ideas and recommendations to a steering committee for consideration to be included into an IP

Residential Working Group (RWG)

- WG made up of homeowners, local citizen organizations & local and state agency staff
- Focus on eliminating human sources of bacteria from septic systems, uncontrolled discharges of human sewage (straight pipes) and pet waste
- Discuss ways to reduce bacteria from these sources including septic system repairs, replacements & eliminating straight pipes

Principal Objective of Residential WG

- Identify obstacles to load reductions & practical solutions to achieve the goal
- Address/identify & eliminate straight pipes, failing systems from dwellings & small businesses
- Recognize there are difficulties faced by landowners in correcting these problems – VDH understandable
- Identify potential funding opportunities to correct problems
- Many successful programs are established to correct this human bacteria source

Agricultural Working Group (AWG)

- Address sources of bacteria attributed to Ag operations
- Focus on identifying obstacles to implementation of best management practices (BMP) & practical solutions to the obstacles
- Solutions selected from an approved list of BMP practices

Government Working Group (GWG)

- Include representatives of three counties and other stakeholders to insure regulatory controls are in place for Residential & Ag WGs recommendations
- ID funding sources, technical resources currently available, additional resources to enhance implementation
- Identify lead agencies for implementation
- Educational outreach element moving forward

Steering Committee (SC)

- Composed of three WGs, stakeholder organizations and public participation
- Examine recommendations from WGs
- With assistance from a technical contractor prepare a draft/final TMDL Implementation Plan - Including public input
- Submit for approval at state & federal level
- Continue oversight during implementation phase and revises Water Quality IP, if required

What is next?

- Comment Period on the Draft Report:
  - December 14, 2011 – January 13, 2012
  - Comments should be submitted in writing to:

    Katie Conaway

    Katie.Conaway@deq.virginia.gov

    13901 Crown Court, Woodbridge, VA 22193
- Response to Comments
- Submit Draft Report to EPA for Approval

Questions?

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